## Feedback — III. Linear Algebra

Help

You submitted this quiz on Tue 18 Mar 2014 4:38 PM IST. You got a score of 5.00 out of 5.00.

### **Question 1**

Let two matrices be

$$A = egin{bmatrix} 4 & 3 \ 6 & 9 \end{bmatrix},$$

$$A = egin{bmatrix} 4 & 3 \ 6 & 9 \end{bmatrix}, \qquad B = egin{bmatrix} -2 & 9 \ -5 & 2 \end{bmatrix}$$

What is A - B?

Your	Answer		Score	Explanation
$ullet$ $\begin{bmatrix} 6 \\ 11 \end{bmatrix}$	$\begin{bmatrix} -6 \\ 7 \end{bmatrix}$	<b>~</b>	1.00	To subtract B from A, carry out the subtraction elementwise.

$$\begin{bmatrix} 6 & -12 \\ 11 & 11 \end{bmatrix}$$

$$\begin{bmatrix} 2 & -6 \\ 1 & 7 \end{bmatrix}$$

$$\begin{bmatrix} 4 & 12 \\ 1 & 11 \end{bmatrix}$$

Total 1.00 / 1.00

## **Question 2**

Let 
$$x = egin{bmatrix} 2 \ 7 \ 4 \ 1 \end{bmatrix}$$

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What is $\frac{1}{2} * x$ ?		
Your Answer	Score	Explanation
$\begin{bmatrix} 1 & \frac{7}{2} & 2 & \frac{1}{2} \end{bmatrix}$		
$\begin{bmatrix} 4\\14\\8\\2 \end{bmatrix}$		
$ \begin{bmatrix} 1 \\ \frac{7}{2} \\ 2 \\ \frac{1}{2} \end{bmatrix} $	<b>✓</b> 1.00	To multiply the vector x by $\frac{1}{2}$ , take each element of x and multiply that element by $\frac{1}{2}$ .
[4     14     8     2]		
Total	1.00 / 1.00	

# **Question 3**

Let u be a 3-dimensional vector, where specifically

$$u = \begin{bmatrix} 8 \\ 1 \\ 4 \end{bmatrix}$$

What is  $u^{\mathrm{T}}$ ?

Your Answer		Score	Explanation
●[8 1 4]	<b>✓</b>	1.00	
○[4 1 8]			
$\begin{bmatrix} 8 \\ 1 \\ 4 \end{bmatrix}$			



# **Question 4**

Let u and v be 3-dimensional vectors, where specifically

$$u=\left[egin{array}{c} 1 \ 3 \ -1 \end{array}
ight]$$
 and  $v=\left[egin{array}{c} 2 \ 2 \ 4 \end{array}
ight]$ 

What is  $u^T v$ ?

(Hint:  $u^T$  is a 1x3 dimensional matrix, and v can also be seen as a 3x1 matrix. The answer you want can be obtained by taking the matrix product of  $u^T$  and v.)

#### You entered:

4

Your Answer		Score	Explanation
4	~	1.00	
Total		1.00 / 1.00	

## **Question 5**

Let A and B be 3x3 (square) matrices. Which of the following must necessarily hold true?

Your Answer		Score	Explanation
$\blacksquare \ A*B = B*A$	<b>~</b>	0.25	We saw in the lecture that matrix multiplication is not commutative in general.
$\ensuremath{\mathscr{S}}$ If B is the 3x3 identity matrix, then $A*B=B*A$	<b>~</b>	0.25	Even though matrix multiplication is not commutative in general ( $A*B \neq B*A$ for general matrices $A,B$ ), for the special case

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		where $B=I$ , we have $A\ast B=A\ast I=A$ , and also $B\ast A=I\ast A=A$ . So, $A\ast B=B\ast A$ .		
<b>~</b>	0.25	This true by the associative property of matrix multiplication. More generally, $(A*B)*C=A*(B*C), \text{ and here we have just set } C=A.$		
~	0.25	Since A and B are both 3x3 matrices, their product is 3x3. More generally, if A were an $m\times n$ . matrix, and B a $n\times o$ matrix, then C would be $m\times o$ . (In our example, $m=n=o=3$ .)		
	1.00 / 1.00			
	~	<ul><li>✓ 0.25</li><li>✓ 0.25</li><li>✓ 1.00 /</li></ul>		